

WHAT IS CLAIMED IS:

1. A device for delivering liquid via a flow channel comprising:  
a flow channel;  
a memory having a stored value indicative of a flow characteristic of the flow channel;  
a controller that generates a flow control signal based on the stored value; and  
a valve responsive to the flow control signal adapted to control flow of the liquid through the flow channel.
2. The device of claim 1 wherein the stored value of the flow characteristic is based on empirical data relating to the specific flow channel of the device.
3. The device of claim 1, wherein the memory has a second stored value indicative of a second flow characteristic.
4. The device of claim 1, wherein the flow channel is part of an infusion set and the controller is part of a flow regulator coupled to the infusion set.

5. The device of claim 1, wherein the flow characteristic is a physical characteristic of the flow channel.

6. The device of claim 5, wherein the physical characteristic is selected from the group consisting of an effective cross-sectional area of the flow channel, an effective radius of the flow channel, and an effective diameter of the flow channel.

7. The device of claim 1, wherein the flow characteristic is a volumetric flow rate value of a fluid previously passed through the flow channel.

8. The device of claim 7, wherein the memory also has a stored value indicative of a velocity of the fluid previously passed through the flow channel.

9. The device of claim 1, wherein the valve is a proportional valve.

10. The device of claim 1, wherein the valve is an on/off valve.

11. The device of claim 4, wherein the flow regulator is adapted to be uncoupled from the infusion set.

12. The device of claim 4 wherein the flow regulator comprises a time-of-flight sensor.

13. The device of claim 4, wherein the flow regulator is adapted to receive data relating to a viscosity of a liquid that will be passed through the flow channel.

14. A method of manufacturing a liquid delivery device,  
comprising:  
    passing a liquid through a flow channel;  
    measuring flow-related data of the flow of the liquid through the  
flow channel;  
    determining a value of a flow characteristic of the flow channel  
based on the flow-related data; and  
    storing at least one of the value of the flow characteristic and a  
value based on the flow characteristic in a memory of the liquid delivery  
device.

15. The method of claim 14, wherein measuring flow-related data includes making a time-of-flight measurement.

16. The method of claim 15, wherein determining the value comprises using a predetermined pressure and a predetermined viscosity value.

17. The method of claim 16, wherein the flow characteristic is a physical characteristic of the flow channel.

18. The method of claim 17, wherein the physical characteristic is selected from the group consisting of an effective cross-sectional area, an effective diameter, and an effective radius of the flow channel.

19. The method of claim 14, wherein the flow characteristic is a volumetric flow rate of the liquid passed through the flow channel.

20. The method of claim 14, wherein the flow characteristic is a time of flight of the liquid passed through the flow channel.

21. The method of claim 14, further comprising storing a second value in the memory, wherein value is a time of flight of the liquid passed through the flow channel.

22. The method of claim 14, wherein the flow characteristic is a fluid volume value, the volume value being a value relating to a volumetric flow rate value and a time of flight value relating to liquid passed through the flow channel.

23. The method of claim 14, wherein the flow channel is part of an infusion set.

24. The method of claim 14, further comprising manufacturing an infusion set by placing a tube in fluid communication with the infusion channel, wherein the tube is in fluid communication with an infusion bag.

25. The method of claim 24, further comprising placing a liquid medicament into the infusion bag.

26. The method of claim 14, wherein the flow related data is time-of-flight data.

27. A method of delivering a liquid via a flow channel, the method comprising:

measuring flow-related data of the liquid flowing through a flow channel;

receiving data from a memory having a flow characteristic of the flow channel stored therein;

determining a value of the flow of the liquid based on the flow-related data and the stored flow characteristic, and

controlling a valve based on the calculated value of flow to control the flow of liquid through the flow channel.

28. A method of delivering a liquid via a flow channel at a desired flow rate, the method comprising:

measuring flow-related data of the liquid passing through the flow channel;

receiving data from a memory having a flow characteristic of the flow channel stored therein;

determining a value of the flow rate of the liquid based on the flow-related data and the stored characteristic value;

comparing the determined value of the flow rate to the desired flow rate; and

controlling a valve to achieve the desired flow rate.

29. A method of delivering a selected liquid via a flow channel at a desired flow rate, the method comprising:

receiving data from a memory having a flow characteristic of the flow channel stored therein;

providing viscosity information of the selected liquid;

providing information related to the pressure causing the selected liquid to flow along the flow channel;

determining a value of the flow rate of the selected liquid based on the stored flow characteristic, the viscosity information and the pressure information;

comparing the determined flow rate to the desired flow rate; and

controlling a valve to achieve the desired flow rate.

30. The method of claim 29, wherein the method is practiced without measuring the velocity of the liquid passing through the flow channel.

31. A device for delivering liquid via a flow channel, the device comprising:

a flow channel; and

a memory having a stored value indicative of a flow characteristic of the flow channel; wherein

the device is adapted to at least one of transfer the stored value from the memory and permit reading of the stored value to enable the volumetric flow rate of a liquid flowing through the flow channel to be determined.

32. The device of claim 31, wherein the device is adapted to enable the volumetric flow rate to be determined to within 1 % of its actual value.

33. The device of claim 32, wherein the device is adapted to enable the volumetric flow rate to be determined to within 0.75 % of its actual value.

34. The device of claim 33, wherein the device is adapted to enable the volumetric flow rate to be determined to within 0.5 % of its actual value.

35. The device of claim 34, wherein the device is adapted to enable the volumetric flow rate to determined to within 0.25 % of its actual value.



36. The device of claim 35, wherein the device is adapted to enable the volumetric flow rate to be determined to within 0.1 % of its actual value.

37. The device of claim 31, wherein the device is adapted to enable the volumetric flow rate to be determined without utilizing actual dimensions of the interior of the flow channel.

38. The device of claim 31, wherein actual dimensions include design dimensions.

39. The device of claim 31, wherein the stored value is based on empirical data relating to the specific flow channel of the device.

40. The device of claim 39, wherein the memory has a plurality of stored values, wherein the device is adapted to at least one of transfer the stored values from the memory and permit reading of the stored values to enable the volumetric flow rate of a liquid flowing through the flow channel to be determined, wherein the plurality of values are based on empirical data relating to the specific flow channel of the device;

wherein at least one of the values is a volumetric flow rate value and at least one of the values is a time of flight value, the volumetric flow rate value and the time value being values relating to fluid previously conducted through the flow channel.

41. The device of claim 39, wherein the value is a volume value, the volume value being a value relating to a volumetric flow rate value and a time of flight value relating to fluid previously conducted through the flow channel.

42. The device of claim 39, wherein the memory has a plurality of stored values, wherein the device is adapted to at least one of transfer the stored values from the memory and permit reading of the stored values to enable the volumetric flow rate of a liquid flowing through the flow channel to be determined, wherein the plurality of values are based on empirical data relating to the specific flow channel of the device, wherein at least one of the values is at least one of an effective cross-sectional area of the flow channel, an effective radius of the flow channel, and an effective diameter of the flow channel, and wherein at least one of the values is a velocity of fluid value relating to velocity of a fluid conducted through the flow channel.

43. The device of claim 31, wherein the flow channel and memory are parts of an infusion set.

44. A device for controlling the delivery of liquid via a flow channel, the device comprising:

a valve adapted to control the flow of fluid through a fluid conduit in fluid communication with a flow channel; and

at least one of a data receiver adapted to receive a value indicative of a flow characteristic of the flow channel; wherein

the device is adapted to determine the volumetric flow rate of a liquid flowing through the flow channel utilizing the received value; and

wherein the device is adapted to automatically control the flow of fluid through the flow channel based on the determined volumetric flow rate.

45. The device of claim 44, wherein the fluid conduit is the flow channel.

46. The device of claim 44, wherein the device is adapted to determine the volumetric flow rate to within 1 % of its actual value.

47. The device of claim 46, wherein the device is adapted to determine the volumetric flow rate to within 0.75% of its actual value.

48. The device of claim 47, wherein the device is adapted to determine the volumetric flow rate to within 0.5% of its actual value.

49. The device of claim 48, wherein the device is adapted to determine the volumetric flow rate to within 0.25% of its actual value.

50. The device of claim 49, wherein the device is adapted to determine the volumetric flow rate to within 0.1% of its actual value.

51. The device of claim 44, wherein the device is adapted to enable the volumetric flow rate to be determined without utilizing actual dimensions of the interior of the flow channel.

52. The device of claim 51, wherein actual dimensions include design dimensions.

53. The device of claim 44, wherein the value is based on empirical data relating to the specific flow channel through which the flow of fluid is controlled.

54. The device of claim 53, wherein the device is adapted to at least one of read and receive a plurality of values, wherein the device is adapted to determine the volumetric flow rate of a liquid flowing through the flow channel utilizing the received values, wherein the plurality of values are based on empirical data relating to the specific flow channel through which the flow of fluid is controlled, wherein at least one of the values is a volumetric flow rate value and at least one of the values is a time of flight value, the volumetric flow rate value and the time value being values relating to fluid previously conducted through the flow channel.

55. The device of claim 53, wherein the value is a volume value, the volume value being a value relating to a volumetric flow rate value and a time of flight value relating to fluid previously conducted through the flow channel.

56. The device of claim 53, wherein the device is adapted to at least one of read and receive a plurality of values, wherein the device is adapted to determine the volumetric flow rate of a liquid flowing through the flow channel utilizing the received values, wherein the plurality of values are based on empirical data relating to the specific flow channel

through which the flow of fluid is controlled, wherein at least one of the values is at least one of an effective cross-sectional area of the flow channel, an effective radius of the flow channel, and an effective diameter of the flow channel, and wherein at least one of the values is a velocity of fluid value relating to velocity of a fluid previously conducted through the flow channel.

57. The device of claim 54, wherein the flow channel and memory are parts of an infusion set, and wherein the device is adapted to interface with the infusion set.

58. The device of claim 54, further comprising a flow sensor.

59. The device of claim 58, wherein the flow sensor is a time of flight sensor.